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ABSTRACT

This journal issue addresses the topic of mastery learning at both the elementary and secondary school levels. The first article, "The Theory and Practice of Mastery Learning" (Guskey), gives a definition of and information about the development, operation, and application of mastery learning, based on the theories of Benjamin Bloom. In addition, the article addresses common concerns about mastery learning and implications for teachers. "Mastery Learning: Its Prospects and Problems" (Horton) identifies six basic components of mastery learning (objectives, preassessment, instruction, diagnostic assessment, prescription, and postassessment) and discusses associated implications and problems. In the third article, "Mastery Learning: Some Suggestions for Implementation" (Shanes), ideas for orientation, enrichment activities, and classroom management are given. Sample letters to parents and students, a glossary of mastery learning terms, and sample enrichment activities are also provided. The final article, "Mastery for Higher Cognitive Thought Processes: Is It Possible?" (Killoran, Zimmer, and Fischer), discusses the construction of tests for higher cognitive thought processes and provides three examples of tests, correctives, and retests. (LH)

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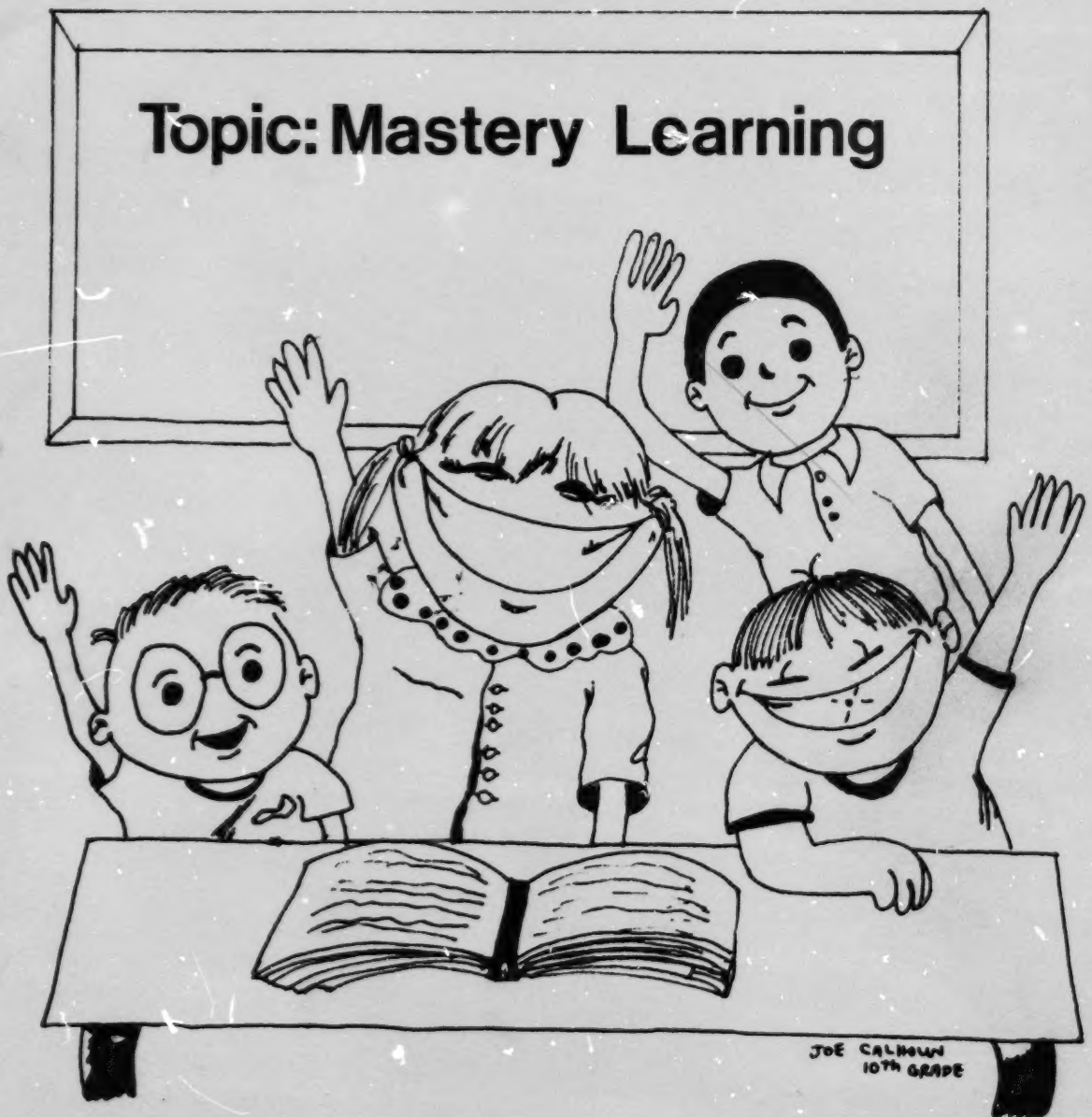

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JOURNAL ARTICLES

Articles relating to the field of social studies education may be contributed by any teacher. Articles should be clearly typed and forwarded to the Editor-in-Chief. A contributor is requested to include his/her name, school, and home telephone number. We hope that the articles will be so thought provoking that the reader will be compelled to address the issue with a letter to the editor.

Single copies of the Journal may be purchased by non-members of the UFT for $1.50 per copy to cover handling and mailing costs.

INTRODUCTION

Quite frequently in the field of education, teachers are introduced to a new and different method for reaching their students. The method currently in vogue in the educational community is called Mastery Learning. Anytime something new is introduced into the mainstream of education, many questions arise. Therefore, this entire issue of the A.T.S.S./U.F.T. Journal is devoted to an examination of some of these questions.

The lead article in this edition of the Journal is by Thomas R. Guskey, Director of the Center for Improvement of Teaching and Learning in Chicago, Illinois. His article explains what Mastery Learning is, how it has come to be developed, and its general application in the classroom.

However, with every new innovation, there are a multiplicity of problems. The next article is by Lowell Horton, a Professor of Education at Northern Illinois University. His article is concerned with some of the divergent prospects that Mastery Learning may hold in store for the educational community.

The third article in this issue is by Robert Shane, the Coordinator of the Mastery Learning Program for the New York City High School Division. His article is primarily composed of various practical exhibits that can be utilized for those who wish to move from the philosophical and theoretical to the practical application of the classroom.

Frequently teachers feel that their tests may be testing the higher cognitive processes, but all too often they are testing the process of memorization. The concluding article by James Killoran, Stuart Zimmer and Joel Fisher, addresses just this problem. Their article focuses on a major goal envisioned by the creators of Mastery Learning, that of testing for the higher cognitive thought processes.

The Journal invites the classroom teacher to taste, sample, and then digest what they find contained in this issue. Feel free to embellish, accept, or reject that which you feel is most appropriate.

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THE THEORY AND PRACTICE OF MASTERY LEARNING

Thomas R. Guskey

Principals and teachers from schools in all parts of the country are asking questions about mastery learning. What is mastery learning? How was it developed? How does it work? In this article I shall try to answer these and other questions about mastery learning. In addition, I shall try to illustrate how mastery learning can provide useful solutions to many of the problems principals and teachers are presently facing.

DEFINING MASTERY LEARNING

Mastery learning is basically a theory about the teaching and learning process. The theory of mastery learning asserts that under appropriate instructional conditions, virtually all students can learn well what they are taught. This does not mean that all students are the same or that all have the same aptitude for learning of a particular subject. It does mean, however, that if we alter the instructional conditions to make them more appropriate for individual students, virtually all will learn, and learn very well, what we set out to teach. Unlike most other theories about teaching learning, however, mastery learning is closely designed to apply the theory in modern classrooms.

For many teachers mastery learning strategies provide a flexible technique to better individualize teaching and learning within the group-based classroom setting (Guskey, 1980a, 1981). There are, of course, a multitude of individualized programs, most of which work quite well in tutorial situations or laboratory settings. But in the typical classroom setting where one teacher has charge of thirty or more students, the vast majority of these programs are particularly difficult to manage. In many cases they create more problems than they help to solve.

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The instructional strategies associated with mastery learning, on the other hand, were developed for teaching and learning within the constraints of the classroom environment. The evidence that these strategies work has been gathered from classrooms across the country and in other parts of the world, not from experimental laboratories. This evidence indicates that although mastery learning strategies are not an educational cure-all, they can be an exceptionally effective tool that teachers can use to have a much more important influence on the learning and achievement of their students.

THE DEVELOPMENT AND OPERATION OF MASTERY LEARNING

The theory and instructional strategies of mastery learning were developed by Professor Benjamin S. Bloom of the University of Chicago. In the middle 1960's, Bloom was investigating ways for teachers to alter a typical teaching sequence in order to provide higher quality instruction for a larger portion of students. In observing how instruction is usually carried out in a classroom, Bloom found that most teachers begin by dividing all that is to be learned over the school year or academic term into smaller teaching units. These units often correspond to the chapters of a basic text. After instruction covering the material in a unit, most teachers administer a quiz or test to check on students' learning. These quizzes usually signify to students the end of instruction on the unit and the end of the time they need to spend working on that material. Quizzes are marked, scores recorded, and then instruction begins on the next unit. Unfortunately, it is typical to find that only a small number of students in the class have really mastered the material in the unit.

To find a strategy that would produce better results, Bloom drew upon two sources of information. The first was knowledge of what takes place in the most ideal teaching situation where a very good tutor works with an individual

student. The second was research studies which examined the activities of academically successful students. Bloom felt that much better use could be made of procedures for checking on the learning process of students. Specifically, he believed that a quiz or test given at the end of each unit did very little other than indicate to the teacher who was doing well and who was not --- unless it was accompanied by some sort of feedback and corrective procedure. That is, checks on learning progress could be used not only to certify competent learners, but also to diagnose individual learning difficulties (feedback) and to prescribe specific remediation procedures (correctives). This is precisely the process that takes place when a good tutor works with a student. If the student makes an error, it is pointed out by the tutor (feedback), and then followed up with further direction and clarification (corrective). Similarly, academically successful students typically follow up on the mistakes they make, seeking further information or greater understanding so the error will not be repeated.

Bloom outlined specific instructional strategies to make use of these feedback and corrective procedures and labeled them "Mastery Learning" (Bloom, 1968). In using mastery learning, teachers first divide the material to be learned over the year or term into smaller learning units, as is typically done. Depending on the level, these units usually consist of material that would be covered by the teacher in about a week or two of instructional time. Following instruction covering the material or objectives from that unit, a quiz or test is administered as a check on learning progress. However, this test has a very different meaning from what is typical. Instead of signifying to students the end of instruction on the unit, it represents a check on learning progress <u>to that point</u>. It is usually not counted as part of the students' grade but rather is designed to provide precise feedback to both the teacher and students regarding which concepts have been learned well

or mastered, and which ones have not. Also included on the test are explicit suggestions to students as to what they can do to help correct their learning difficulties. These suggested correctives are specific to each item or part of the test and thus, each student needs to work only on those concepts that he or she has not yet mastered. In other words the correctives are individualized. They are designed to identify for the student a different approach to learning that concept. They may point out where in the text the concept was discussed so that the student might reread those pages, they may identify an alternative learning source such as different text, cassette tape, film strip, etc., or they may simply indicate sources of additional practice such as a study guide or worksheets. Thus with the results from this "formative" test (Bloom, Hastings, and Madaus, 1971), each student has a very specific prescription of what more needs to be done to master the material or particular learning objectives from that unit.

Through this process of formative testing, combined with systematic correction of individual learning difficulties, each student can be provided with a more appropriate quality of instruction than is possible under more traditional approaches to classroom instruction. A teacher's initial approach to teaching a concept is likely to be appropriate for many students in the class, but is also likely to be inappropriate for many others. For those students, another alternative approach is made available. Bloom believed that under these conditions virtually all students could learn very well and truly master the subject material (Bloom, 1976).

THE APPLICATION OF MASTERY LEARNING

Since the development of these theoretical ideas, programs incorporating mastery learning strategies in regular classrooms have been initiated in school systems across the United States. These programs have resulted in impressive gains in students' learning and achievement in large city

school systems such as New York City, Chicago, and Denver, as well as in smaller systems as Lorain, Ohio and Red Bank, New Jersey (Fiske, 1980; Guskey, 1980b). In most of these programs teachers have been trained in theory and techniques of mastery learning through inservice education or special staff-development sessions. Then individually or in teams, these teachers develop the materials they need to implement mastery learning strategies in their classrooms. In New York City, for example, groups of teachers work in subject area or grade level teams during summer workshops and inservice meetings held at the school to develop their mastery learning materials. Together they organize their instructional objectives and develop formative tests so they can incorporate the feedback and corrective process into their regular instructional sequence.

The tasks for a teacher or a group of teachers in this process of developing materials and teaching for mastery are usually divided into five steps: valuing, planning, managing, evaluating, and revising (Block and Anderson, 1975). During the initial valuing step, each teacher reviews his or her instructional objectives and makes judgments about what material should be learned by all students and to what level. In other words, each teacher separates the important concepts and information from what might be considered trivial, and also decides whether students should be able to simply recall those concepts, or be able to apply them in a new and different situation, or synthesize them in a meaningful way, etc. For example, there may be ten or twenty new terms presented in every unit in a biology class. However, only a few of these are ever used again in later units and are important in understanding more advanced concepts. These are certainly the terms that all students should know and should be able to apply.

Most teachers find it useful to outline these decisions in what is called a "Table of Specification" (Bloom, Hast-

ings, and Madaus, 1971: Bloom, Madaus, and Hastings, 1981). Unlike a lesson plan, these tables specify what is to be taught, but not necessarily how. Preparing a table such as this will be used to evaluate students' learning (the standard of mastery), and the particular sequence of instruction that can optimally lead to mastery. As a result the evaluation of students can be based upon specific learning criteria rather then an arbitrary standard. Although teachers already make these decisions as part of their regular teaching, specifying them in this manner is often found to be most difficult, but most useful step in preparing to implement mastery learning.

The next step involves planning. With the learning objectives and instructional sequence organized, teachers now focus their attention on preparing formative tests and accompanying corrective procedures. Again, a formative test is basically a diagnostic instrument used by the teacher to assess learning and to aid in planning corrective measures to remedy errors in the original instruction. As such, a formative test can take many forms. In most cases, it is a short objective test made up of matching, multiple-choice, or completion items. But an essay, composition, or skill demonstration can also be used as a formative test, so long as performance criteria are specified and are made clear to students.

At the high school level, a formative test typically covers the material presented in a chapter of the text used with the instruction, but it may be substantially less at lower elementary grades. The Table of Specifications serves as the principal guide in preparing the formative tests. That is, each item, group of items, or essay question is designed to get at a particular concept which has been identified as important to learning the subject material. In addition, suggested corrective measures that identify sources of information about that concept and paired with each

group of items. These correctives may also take a variety of forms and usually vary from one unit to the next. For instance, they may suggest alternative materials, peer or cross-age tutoring, or any type of learning activity which allows for differences in sensory or motivational preferences.

The effectiveness of the correctives is often assessed through the use of a second formative test, parallel in form to the first test, but asks questions in slightly different says or in different forms. If the correctives have been successful in helping students to remedy their individual learning difficulties that were identified on the first formative test, almost all students might be expected to attain "mastery" on this second, parallel form test. The second formative test also serves as a powerful motivational device by demonstrating to students that they can improve their scores and be successful in learning activities.

The final activity involved in the planning stage is the development of a "summative" exam. This exam is much broader based and wider in scope than are any of the individual formative tests and is administered after several units have been covered. It is designed to assess the criterion objectives of the course and is typically used for assigning grades to students.

Having mad the value judgments about what is to be learned or mastered, and having planned the learning tasks, tests and correctives, teachers now focus on <u>managing and coordinating</u> mastery learning within their classrooms. This step includes informing students of the intentions and procedures of mastery learning strategies, and then initiating the group-based, teacher-paced, mastery learning instructional format. Using mastery learning usually requires very few changes in the classroom procedures of teachers. Lessons covering a learning unit are taught to the class and are then followed by a diagnostic formative test. Based upon

the results of the formative test, the class is divided into two groups: those students who have mastered the set of concepts presented in the unit, and those who have not. Those who have mastered the concepts are typically involved in enrichment activities to broaden and extend their learning, or they may be involved as peer tutors for other students in the class. Those who have not mastered the concepts are engaged in corrective activities to help remediate their learning difficulties. Then, students who worked through the correctives take the second formative test to check on the success of the remediation.

Usually no one corrective or enrichment approach will work all of the time. Variation is necessary in order to maintain students' interest and motivation. Most teachers find that about ten percent additional time is needed for the corrective process, with more needed during the early stages and less later on.

After managing the implementation of mastery learning strategies over a series of units, the final step is for each teacher to evaluate the final competence of the students through the use of the summative exam and then to reflect upon how to revise the strategies for future instruction. Ideally each teacher should find that close to eighty percent of students in the class attain the mastery level of achievement that was previously attained by only about twenty percent. Moreover, mastery learning strategies are designed not only to increase the level of student achievement, but also to decrease the variability in achievement among students with respect to the instructional objectives (Bloom, 1976).

COMMON CONCERNS ABOUT MASTERY LEARNING

When principals and teachers first learn of mastery learning they often raise several general concerns regarding the use of these instructional strategies. One of their most prevalent concerns has to do with the constraints of

class time. With the limited amount of time available, teachers are often concerned about how feedback and corrective procedures can be introduced without reducing the amount of course content which is covered. That is, if students in mastery class care allowed extra time to correct learning difficulties after each unit, will they not fall progressively further behind students in classes taught by more tradional methods?

The experience of teachers who have implemented mastery learning techniques indicates that, because this approach to instruction is so different from what students typically encounter, extra time is required at the beginning of a course in order to orient students to the new procedures. In addition, most teachers also find it necessary to set aside some class time during the first few learning units for students to work on corrective activities. But once students become familiar with the feedback and corrective procedures, this amount of time is often reduced. In fact, some teachers have found that after the first two or three units, much of the corrective work can be done by students outside of class as a homework assignment.

In those cases where teachers have continued allowing class time for corrective work, they have generally found that the pace of their instruction in later units can be much faster than it was in earlier units. By assuring that most students in a class have mastered the material from previous units, teachers generally find that students are not only better prepared for later, usually more advanced material, but oftern can anticipate what is to come. (Guskey, Englehard, Tutle, and Guida, 1978). Thus instruction over material presented later in a course can often proceed at a faster pace than is usually possible under more traditional methods of instruction.

Implementing mastery learning procedures does, therefore, require some additional class time, particularly at the be-

ginning of an instructional sequence. But even when the use of that time restricts the scope of the content covered in mastery classes, students in those classes do consistently better on standard final examinations over the course content than students in classes taught by more traditional methods (Block and Burns, 1977).

Another common concern stems from questions about what to do with the faster learners in the class. While mastery learning strategies appear to work very well for slower students and for that broad middle range of students, does it not restrict the progress of the top students in a class? Furthermore, if the fastest learners in a class are used as tutors for the slower learners, is their "potential" not being denied?

One of the most promising aspects of the mastery learning approach, however, is the fact that it actually allows the faster learner greater flexibility. Typically, after the first formative test over a learning unit, those students who have demonstrated mastery are presented with a number of alternatives. For instance, they may work on a special project, participate in a number of special enrichment activities or explore any of a number of alternative learning experiences. Under more traditional instructional methods, options such as these are usually not availabe. Instead, faster students must participate in review and reteaching exercises which are not only unnecessary for the, but are often frustrating and boring.

On those occasions when the teacher structures peer tutoring within a class, faster students may gain many personal interaction experiences which are not usually available in more strictly individualized programs. Working with others to attain a commonly shared goal (learning) can not only enhance a sense of cooperation and sharing, it also strengthens and in many cases broadens the original learning. These types of cooperative social action experiences can play

an important role in every student's educational experience.

A final concern often raised as teachers begin implementing mastery learning strategies pertains to teaching for higher level skills. Most teachers readily see the utility of these strategies for training students in very simple skills, but some fail to see how they might be applicable in developing more complex student behaviors.

Many teachers using mastery learning, however, have devised a variety of schemes for focusing instruction on higher level cognitive skills and then have matched tests and corrective procedures to those instructional objectives. In fact, one of the most successful mastery learning programs is one designed specifically to teach students the higher level skills associated with reading comprehension (Jones and Monsaas, 1979). Another example is the successful application of mastery learning in English composition and counseling courses (Guskey and Monsaas, 1979). Research studies on students' achievement of higher cognitive skills under mastery learning instruction also illustrate its direct applicability (Mevarech, 1981: Seymour, 1977). So while mastery learning does work well with instruction on lower level skills, the strategies appear to work equally well when the focus of teaching and learning is upon higher cognitive level skills.

IMPLICATIONS OF MASTERY LEARNING

Over the past decade, a great deal has been learned about the application of mastery learning strategies. Teachers using these strategies have shown, for example, that their application is tremendously flexible. Two teachers in the same school, teaching the same subject, at the same grade level, are likely to apply mastery learning instructional strategies in their classes in different, but equally effective ways. There will, of course, be many common elements. For instance, each is likely to follow a similar sequence of group instruction, feedback, corrective procedures, and then a check on the correctives. But how the group instruc-

tion is handled, how the corrective process is carried out, and how correctives are checked are all likely to be different.

In addition to the flexibility, mastery learning strategies have been very well received by teachers in a variety of educational settings because, unlike other approaches to teaching and learning, they do not require teachers to drastically change their methods of instruction. Instead, teachers have been encouraged to adopt mastery learning strategies, particularly the use of the feedback and corrective elements, in whatever manner best fits their instructional setting. Teachers generally have a wide repertoire of instructional tactics available and are very resourceful in drawing upon them. Mastery learning strategies have provided teachers with a very useful and purposeful tool which blends well with their present teaching methods, while enabling them to enhance the learning which takes place in their classrooms (Guskey, 1980c).

Perhaps most importantly, the use of mastery learning strategies implies a very important change in the teacher's role in the clasroom. In most traditional classroom settings, learning is a very competitive activity. Students compete among themselves for the few scarce rewards (high grades) to be given out by the teacher. The importance often attached to "grading on the curve" exemplifies this perspective. Under these conditions the teacher serves as a rule-maker and a director of the competition, whose primary responsibilities lie in clasifying students. With mastery learning, however, learning becomes a cooperative rather than a competitive endeavor. In a mastery learning classroom, students come to see themselves and the teacher as both on the same side, out to 'master' what is to be learned. For students this means that it is no longer detrimental to one student's chances of success to help another student to be successful too. Grades are distributed in terms of what has been learned or mastered,

not in terms of relative standing among classmates. In fact, many teachers find that peer-tutoring occurs spontaneously in mastery learning classes as students urge each other to do well (Stahman, 1980). For teachers, this means that they must now be instructional leaders and learning facilitators, working with students, rather than simply managers of copetition among students.

Many teachers have found that through the use of mastery learning they have a more powerful influence on their students' learning. The process is certainly no educational panacea and does not provide solutions for all the problems teachers and school administrators must face. But at the same time, it has proven to be one way in which teachers can dramatically increase the number of students who learn very well what they set out to teach.

REFERENCES

Block, J.H. and Anderson, L.W. Mastery Learning in Classroom Instruction. New York: Macmillan, 1975.

Block, J.H. and Burns, R.B. Mastery Learning. In L.Schulman (Ed.), Review of Research in Education (Vol. 4). Itasca, Ill.: Peacock, 1977.

Bloom, B.S. Learning for mastery. (UCLA-SCEIP) Evaluation Comment, 1968, 1(2).

Bloom, B.S. Human Characteristics and School Learning. New York: McGraw-Hill, 1976.

Bloom, B.S., Hastings, J.T. and Madaus, G.F. Handbook on Formative and Summative Evaluation of Student Learning. New York: McGraw-Hill, 1971.

Bloom, B.S., Madaus, G.F. and Hastings, J.T. Evaluation to Improve Learning. New York: McGraw-Hill, 1981.

Fiske, E.B. New teaching method proceduces impressive gains. The New York Times, Sunday, March 30, 1980, 1 and 37.

Guskey, T.R. Individualizing within the group-centered classroom: The mastery learning model. Teacher Education and Special Education. 1980a 3(4), 47-54.

Guskey, T.R. Mastery learning: Applying the theory. Theory Into Practice, 1980b, 19(2), 104-111.

Guskey, T.R. What is mastery learning and why do educators have such high hopes for it? Instructor, 1980c 90(3), 80-86.

Guskey, T.R. Individualizing instruction in the mainstream classroom: A mastery learning approach. Education Unlimited, 1981, 3(1), 12-15.

Guskey, T.R.,Englehard, G., Tuttle, K. and Guida, F. Report on the pilot project to develop mastery course for the Chicago public schools. Chicago: Chicago Board of Education, Center for Urban Education, 1978.

Guskey, T.R. and Monasaas, J.A. Mastery learning: A model for academic success in urban junior colleges. Research in Higher Education, 1979, 11(3), 263-274.

Hunsaker, J.S. and Roy, W. The group-centered classroom: Alternative to individualized instruction? Educational Leadership, 1977, 34 (5), 366-369.

Jones, B.F. and Monsaas, J.A. Improving reading comprehension: Embedding diverse learning strategies within a Mastery Learning Environment. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1979.

Mevarech, Z.R. Attaining mastery on higher cognitive achievement. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, 1981.

Ross, S.M. and Rakow, E.A. Learner control versus program control as adaptive strategies for selection of instructional support on math rules. Journal of Educational Psychology, 1981, 73 (5), 745-753.

MASTERY LEARNING: ITS PROSPECTS AND PROBLEMS BY LOWELL HORTON

Proponents of mastery learning claim, and research supports their claims, that an added investment of 10 percent to 20 percent over present instructional efforts can result in nearly universal mastery of the school curriculum. Mastery learning is the attainment of adequate performance levels on tests measuring specific learning tasks. It also describes an instructional model whose underlying assumption is that nearly every student can learn everything in the curriculum at a specified level of competence if the learner's previous knowledge and attitudes about the subject are accounted for, if the instruction is of good qality, and if adequate time on the task is allowed to permit mastery.

The mastery model has six basic components. Concise, testable objectives clearly describe the criterion for mastery and offer specific statements of outcomes and goals expected at the completion of each learning task; they are presented at the onset of the learning process. Preassessment of the learner's present level of learning permits correct placement in the learning sequence with learning materials likely to be most effective. Instruction seeks to have each learner work at his own pace, in continuous progress toward mastery of the learning objectives; it usually consists of some large-group, some small-group, and some one-to-one teaching, including peer tutoring, with various combinations of computer-assisted instruction, programmed instruction, games, worksheets, and other activities also included.

Diagnostic assessment during instruction determines if the learner is progressing as expected; it is used to pace the learner and to adapt instruction as needed. This is followed by prescription for further learning, which pro-

The above article was originally printed in the December, 1981 issue of The Education Digest. It is a condensed version from Mastery Learning, Fastback 154, published by the Phi Delta Kappa Educational Foundation, Bloomington, Indiana.

vides for progression to new learning tasks or remediation, with enrichment materials prescribed for those who finish the tasks ahead of others; prescription begins early in the instructional process and continues until nearly all learners achieve mastery. Postassessment, the sixth and last component, measures individual outcome identified in the objectives. Results can be used to refine the objectives, improve instruction, and clarify the mastery criterion.

Mastery learning differs from traditional teaching in the level of specificity and precision required in the design of mastery learning programs. Planning must be accomplished much earlier in the instructional process than in conventional teaching. Content is laid out in a logical, sequential way, and emphasis is on adapting the instruction to permit all learners to achieve mastery. The teacher must believe all children are capable of reaching mastery---and behave accordingly. Mastery learning also requires greater schoolwide support and administrative commitment. It is more successful if used schoolwide or districtwide, where several teachers work and plan together and pool resources.

IMPLICATIONS

What are the implications of all this classroom practice? Besides learning about the mastery model, teachers will need to examine their personal attitudes; a teacher not committed to the philosophy of mastery learning should not attempt it.

In planning, the first task is to examine content to be taught in order to refine objectives. These must be stated in concise, behavioral terms that can be accurately measured. The component skills needed to achieve the objectives must be identified and test developed to measure mastery of these skills. The criterion for mastery should be established at this stage of planning. Learning units lasting

about 2 to 10 hours must be planned and lesson plans developed for each element of the units. Diagnostic tests, corrective and remedial steps for each unit, and enrichment activities for each unit are an integral part of the planning. Much of the work of mastery learning occurs before instruction begins. Once the program is under way, and as teachers gain experience and share material and ideas, the work load is reduced.

Since most students will be unfamiliar with mastery learning, a thorough orientation is essential. Early orientation for parents may also be helpful. In teaching the elements of the learning units, teachers should (1) allow students adequate time to practice each new skill; (2) provide frequent, regular and direct reinforcement; (3) give students cues to help them select the appropriate responses; (4) see that all students participate actively in the learning tasks; (5) furnish direct instruction in the learning task; and (6) monitor each student's work carefully and often.

Mastery learning can be initiated by starting with one subject at a time and moving to other areas as the teacher and students feel ready. Since basic skills areas lend themselves more readily to the mastery approach, it is wise to start in one of these areas. It is also important to provide a classroom environment conducive to mastery learning, emphasizing respect for the academic work being done and a need for continued improvement. The environment most likely to facilitate learning is one that is supportive and nurturing but also businesslike and task-oriented.

PROBLEMS

What problems are associated with mastery learning? First, it requires specifically stated instructional goals, which most educators find more difficulty to agree on than broad educational goals. Further, many teachers have not had the training or experience to tailor their instruction to specific goals required by mastery learning. Available

models for mastery learning provide only broad, general guidelines and leave the filling in of day-to-day and minute-to-minute strategy up to the teachers. Teachers will need more preservice and inservice training before mastery learning can be widely used in classrooms.

Second, proponents of mastery learning interpret equality as meaning that students attain mastery of the same competencies. Opponents argue that equality is the opportunity to develop in different directions according to ones' abilities and interests, but not necessarily to achieve the same results. Opponents are concerned that emphasis on achieving specific instructional goals may be at the expense of other curriculum areas. Until this philosophical difference is resolved, mastery learning is not likely to be widely supported by the entire educational community.

Another problem stems from the fact that, for mastery learning to succeed, more and better instruments for diagnosing student academic problems and assessing gains must be readily available to teachers for use without the help of specialized personnel.

Without effective corrective instruction at each step of the way, mastery learning fails, and this is also a problem. At present, we have neither the resources nor well-defined instructional modes to assure that mastery learning will work. (However, we are more sophisticated in providing corrective help needed in basic skill areas than in such areas as teaching students to think creatively or to engage in decision making.)

Many teachers perceive themselves to be working at full capacity now, and to increase instructional time and effort only 10 to 20 percent seems overwhelming. Unless a teacher is dedicated to the concept of mastery learning, the enormity of the task is likely to hinder its widespread adoption.

If more attention must be paid to learning at the preschool and primary levels, this may mean spending more money

in the early years and less later on. Whether educators and the public are willing to act on what we know about the importance of learning in the early years is an open question.

Does mastery learning suggest a closed curriculum? After a student achieves mastery, does the teacher provide additional content for mastery? If so, are 95 percent of the students expected to master this enrichment material too? The sticky problem of definition of curriculum is an inherent concern in working with mastery learning. Until some of these questions are resolved, mastery learning is likely to stay outside the mainstream of American classrooms.

Furthermore, in nearly all schools, time is fixed while the amount of content mastered is flexible. Mastery learning requires flexible time allotments to assure a fixed mastery of content. We have yet to invent practical means for implementing this in day-to-day school planning. Until we overcome this barrier, we cannot use mastery learning to the extent its proponents advocate.

A final problem is that educators are generally humanistically oriented people who might look askance at a model grounded in a behavioristic base for teaching and learning. Many teachers reject the notion that learning can be broken down legitimately into small bits and pieces and then presented to the learner sequentially and systematically. While mastery learning need not be completely rooted in behavioristic, stimulus-response psychology, the associations with it are well-founded enough to raise concern in many teachers. For mastery learning to succeed, teachers will have to be convinced it can also contribute to divergent and creative learning styles. If perceived to be at variance with most teachers' experiences of what constitutes a good learning environment, it cannot succeed.

EXAMINE CRITICALLY

Mastery learning is not to be undertaken without a lot

of thought and preparation. We do not know whether it works with all subjects in all classrooms, but it does offer exciting ideas about organization of instruction that could result in some positive consequences. The concept should cause us to examine critically our present notions about how teaching and learning can best be accomplished, what is the most important content the schools have to teach, and whether everyone should learn the same material to the same level of competence.

While mastery learning is not the answer for all (and may not be the answer for most), it provides provocative assertions all educators might well explore. It has the potential for making a difference in the society those schools serve. As an innovative method and a powerful concept, mastery learning deserves our careful consideration.

MASTERY LEARNING: SOME SUGGESTIONS ON IMPLEMENTATION

Robert Shanes

As coordinator of the Mastery Learning Program for the New York City High School Division, I have come in contact with many different teachers testing out the ideas inherent in the theory of mastery learning. I have found that very few teachers have problems with the basic philosophy of mastery learning. They quickly grasp its basic principles. However, some teachers have expressed their concern over the practical implementation of this mastery learning philosophy. It is to this issue of practical implementation that I would like to address this article.

1. ORIENTATION

It is crucial that both students and parents understand from the beginning that the students are embarking upon a new and special program designed to help them in their studies. You will find sample letters to the students and to their parents helpful in beginning any course in mastery learning (see exhibit 1 and 2). You will note, that the letters to both the students and their parents emphasizes the special nature of the program in mastery learning, and how it is going to help the student.

A frequent problem that arises in the implementation of the mastery learning program in the classroom is the nagging problem of communications. A vocabulary sheet (see exhibit 3) will go far to help clear up some of the communications problems that the teacher may encounter.

2. ENRICHMENT ACTIVITIES

Students who are involved in the mastery learning program often understand and pass the first time around, when new material is introduced. Students who are successful in the initial phase of mastery learning, gain the opportunity to engage in various enrichment activities and programs. Read-

ings, outside activities, and other interesting projects are provided in order that the students expand upon and enrich their understanding of the content being presented (See exhibits 4, 5, and 6).

3. CLASSROOM MANAGEMENT

Correctives involve a large initial investment of time and pre-planning by the teacher, but the initial investment need be made only once. Corrective materials can be used over and over, with only minor modifications. Correctives are only for a short period of time, usually one to three days. Most teachers can handle this by using whole class exercises, team teaching, and peer tutors. The amount of time allowed for correctives depends on the formative A test results. If the results are poor, more time should be allowed for the corrective process. It is also a good idea to allow extra time for correctives at the beginning of the school term, when the students are still not sure how the whole mastery learning process works. This time can be made up on later units when the students have a better understanding of the work and the mastery learning process.

An overview of the various test scores might be quite helpful in classroom management, and in allowing the teacher to chart the various students progress, (see exhibit 7).

If you would like additional information regarding other concerns, you can call me at 596-4362 or 373-2855; or you may write to me at John Dewey High School, 50 Avenue X, Brooklyn, New York 11229.

EXHIBIT 1: THE SAMPLE LETTER TO THE PARENT

Dear Parents,

This term your child is going to be involved in a new program. We call it Mastery Learning. I am confident that if we all cooperate together, your child can achieve high performance in this program.

Here is what Mastery Learning is all about. In Mastery Learning the teacher instructs the class just as was done before. However, at the end of every unit of instruction (usually two weeks), your child will take a diagnostic test to measure his or her progress. This diagnostic test will tell your child what he or she did and did not learn, and it will tell the teacher what corrective help is needed for your child.

After the teacher has given the corrective help, there will be a re-test or "re-take" of the first test. The procedure will be followed for all units this year. After several units have been taught, a test will be given on these units. At the end of the term, there will be a final examination.

In Mastery Learning no student is permitted to fall behind. It is very important that you make sure that your child comes to school on time. The frequent testing and corrective help will allow your child to learn well. Careful records and charts of your child's progress toward mastery will be maintained through-out the school year.

We are excited about this program, and will be happy to answer any questions you may have about it.

Sincerely yours,

ROBERT SHANES

I have read the above letter about Mastery Learning.

_____
Parent's signature

_____
Student's signature

EXHIBIT #1A: ADDENDUM TO LETTER TO PARENTS

A fascinating change occurs in the learning curve of a class using the mastery learning strategy. The two charts below show how the form of the learning curve changes.

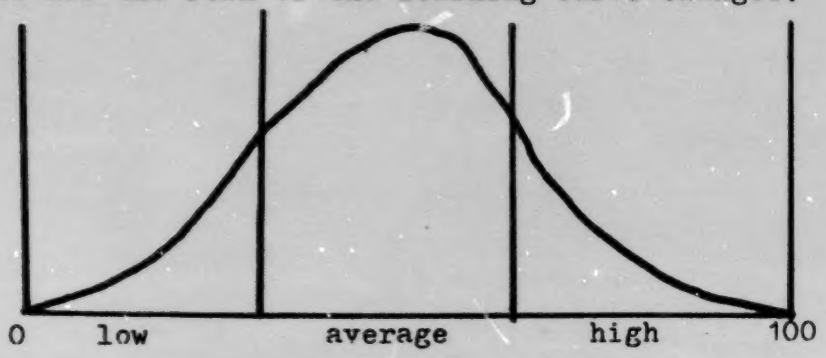


Fig. 1 NORMAL CURVE OF DISTRIBUTION OF TEST MARKS

Normally, when the test marks of a regular class are put on a graph, they will be distributed along the curve shown above. This bell-shaped curve is called the normal curve of distribution. It shows that one-third of the class did poorly, one-third was average, and one-third of the class had high grades. In mastery learning classes, the shape of this curve changes. It shifts to the right, recording higher marks for many more than just one-third of the class. This graph shows that if students are given this second chance to correct initial errors, they can do better individuallly and as a class.

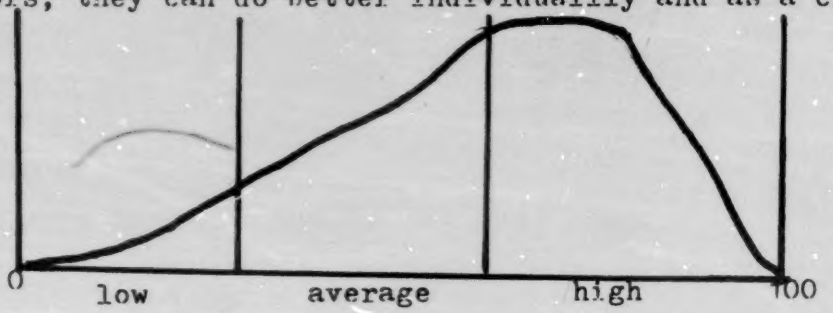


Fig. 2 CURVE OF TEST MARKS FOR MASTERY LEARNING

The majority of students got higher marks because Mastery Learning truly helped them master what they were responsible for learning.

EXHIBIT #2: SAMPLE LETTER TO THE STUDENT

Dear Student,

Here is what is goin to happen in my class this term. Mastery Learning is a systematic (step by step) way of teaching and learning. This means that we will follow certainsteps in the classroom. Each of the steps we will follow has only one major goal---to help you master the objectives (goals) of this term's work. We will discuss these objectives as part of this orientation and as we go along.

But for now, let's see what will take place first:

So that you can be helped to learn in the best way possible, you will fill out the Attitudinal Questionnaire. This will help us to understand your feelings about this subject, school, and youself. It will be distributed after you have finished looking through this booklet.

The most exciting thing you will notice that will be different will be the way tests are given. They are not even called "tests". They are actually assessments. An assessment is a way of finding out if you have learned everything that was taught.

The important topics of this term's work have been divided into units. They will take one or two weeks to teach. After teaching each unit, your teacher will give you two assessments. These are called Formative A and Formative B.

The mark that you get on Formative A does not necessarily count. This assessment is a diagnostic one to find out what was not clear to you. Knowing the questions that were missed is important to you and your Mastery Learning teacher. It provides information for the next very important step---the corrective process.

In the corrective process, you will be retaught, or you will restudy, the mass of material that you missed.

As soon as you have reviewed and learned what was not clear, you will get another chance to earn a good grade. You will be given the second assessment, Formative B. Most students will improve their grades because they were given more time to learn the material.

This pattern of giving a formative A assessment, the correctives, and then the Formative B assessment, will be repeated after each unit that is taught through-out this school term.

If you have any questions or problems, feel free to bring them to my attention.

EXHIBIT #3: GLOSSARY OF TERMS ASSOCIATED WITH MASTERY LEARNING

ASSESSMENT: A way of finding out what you are not sure of or missed in learning; a diagnostic test.

ATTITUDINAL QUESTIONNAIRE: A way to express how one feels about different things.

COMPETITIVE: A manner of striving with another for a prize position or mark.

COOPERATIVE: A manner of working together.

CORRECTIVE: A process in mastery learning in which items missed on an initial test are re-tested after they have been retaught or restudied in order to achieve mastery.

CURRICULUM: A sequence of topics arranged in an order to teach about an area of knowledge; a course of instruction.

DIAGNOSTIC: Relating to finding out how something is functioning by means of an examination, an analysis; in this case of how much you have learned.

ENRICHMENT: Activities done by students in mastery learning classes who do not need corrective work.

FORMATIVE A: The first diagnostic assessment of what was mastered after a subject unit has been taught.

LEARNING CURVE: A mathematical curve determined by placing all test marks of a class on a graph ranging from 0 to 100.

MASTERY LEARNING: A teaching strategy researched and described by Dr. Benjamin Bloom and others in which students are given an appropriate amount of time to learn suited to their rate of learning and learning styles.

NORMAL CURVE OF DISTRIBUTION: A spread of marks around the middle point of two extremes, called a 'bell curve' because of its symmetry.

OBJECTIVE: Something concrete that is worked toward, a specific goal.

ORIENTATION: Introductory discussion about the parts of a new experience.

PRINCIPLES: Rules or assumptions concerning the function or operation of a process.

REFERENCE: Something that provides basic information about a particular idea or subject.

STRATEGY: An over-all plan of action.

TABLE OF OBJECTIVES: A special chart prepared for every unit in mastery learning sequence which outlines the vocabulary, concepts, facts, principles, applications and ways to analyze and synthesize the subject matter.

EXHIBIT #4: ENRICHMENT ACTIVITIES

A. Prepare a scrapbook of five newspaper articles about world events. Summarize each of those articles, and tell how much impact it has had on the United States.

B. Write a primary source account of a real or an imaginary event in history.

C. Create a time line that will show the ancient, medieval and modern time periods. Indicate the major historical events in each time period.

D. Draw a cartoon. Have this cartoon illustrate the idea of cultural diffusion, and write an explanation that indicates how your cartoon shows this to be the case.

EXHIBIT # 5: SAMPLE ENRICHMENT EXERCISE

ADAM SMITH: Where are you now when we need you? (Intellect, Nov. 1975)

By Tim D. Kane
Director, Center for Economic Education, Midwestern University, Wichita Falls, Tex.

THIS PERIOD of rising prices amid recession has nearly everyone confused about almost everything except the usefulness of economists—which is generally agreed to be just about zero. All of which would come as no surprise to the father of economics were he still around. Since Adam Smith, perspectives steadily narrowed—weeding out the "non-economic" factors. Unfortunately, this also reduced our ability to understand things, and "stagflation" is a case in point. This narrowing—which must be reversed—results from four historical forces.

First, much has been made of the impact of the so-called "knowledge explosion" upon the structure of employment, social mores, and mobility, but here it enters the picture as a severe and growing constraint upon perspectives. Being only human, the economist reacted to the increasing flood of information much as any other person would—he retreated. By narrowing his "field," he was able to hold the amount of new knowledge to some tolerable level. Unfortunately, while one can better understand photosynthesis by studying a single tree, the same does not apply to forest fires.

A second major factor of importance is the "quantitative" explosion. Calculus made economics a "science," or so it seemed, at a single stroke. From there, it was a short step to matrix algebra, programming, and multiple regression. With the aid of computers, one can now take some of the basic data from the knowledge explosion and square them, lead them, lag them, and take their logs until the number of possible expressions of a single phenomenon defies the imagination. Make no mistake about it, the quantitative age has brought a deeper understanding of more narrow problems, but it has also combined with the increasing amount of basic data to confound efforts to make sense out of the whole experience.

Third, in 1936, when the "new economics" was born, the public did not believe the government *could* do anything about massive economic dislocations. In 10 short years, the public had done an about face and, through the Congress, had made it the government's "responsibility" to take action. Much of the impetus for such a reversal came from within the economics profession. After all, weren't we "social scientists," and didn't industrialized societies require full employment, steady growth, and stable prices? Nothing less would do! Having thus properly indoctrinated the populace with the awesome power of economic policy, the economist began at once to stagger under the load.

Finally, there is the factor of social and personal disorientation. Catapulted to the fore by Alvin Toffler, the implications of wholesale disorientation or "future shock" are just funny to some, but quite serious to others. Regardless, the specter of a society without rules or predictable behavior patterns is a factor to be reckoned with. "Future shock" affects the economist's task in several ways. First, the rate of change in economic variables is boosted, bringing the future ever closer to the present, and second, the constants in our models (those descriptive of basic values and attitudes) are beginning to shift both in magnitude and in their interrelationships. As a result, the models must be reestimated more often and, nevertheless, are obsolete quicker. The promises of more data and more sophisticated analysis are defied by the speed of change itself.

Enter Adam Smith, professor of moral philosophy. Alas, Mr. Smith did not know about calculus or computers or models, but he saw, understood, and described the 18th-century market system with a competence and ease that today's economist can only envy. One is no longer a professor of moral philosophy with its broad perspective. One is not even a professor of economics, but, rather, a professor of manpower economics, or monetary theory. In defense, we argue: "Well the world is more complicated today—so specialization is a must." So, too, was the 18th century more complicated than the Roman world—yet scholars retained their perspective. In fact, the "world's more complicated" argument is contradictory. Just as the world is more complicated, so too is it more interdependent, and interdependence can not be better understood by narrowing fields. Second, the simple weight, mass, and rapid obsolescence of knowledge means that regardless of how narrow the field becomes—the data *will* overwhelm the scholar. Given that, why not be an overwhelmed professor of moral philosophy who could weigh the impact of disorientation, politics, and morality upon the nation's economy (along with deficits and money supply growth), rather than a professor of manpower economics who could not?

1. What do you think are the four historical causes that Kane states are the reasons why we are not understanding the economic events of our time?
2. Do you think there is any connection between these causes and the title of the reading?
3. Do you agree with Kane that one should try to be more a "generalist" rather than a 'specialist'? Explain in full.

EXHIBIT #6: ANOTHER SAMPLE ENRICHMENT EXERCISE

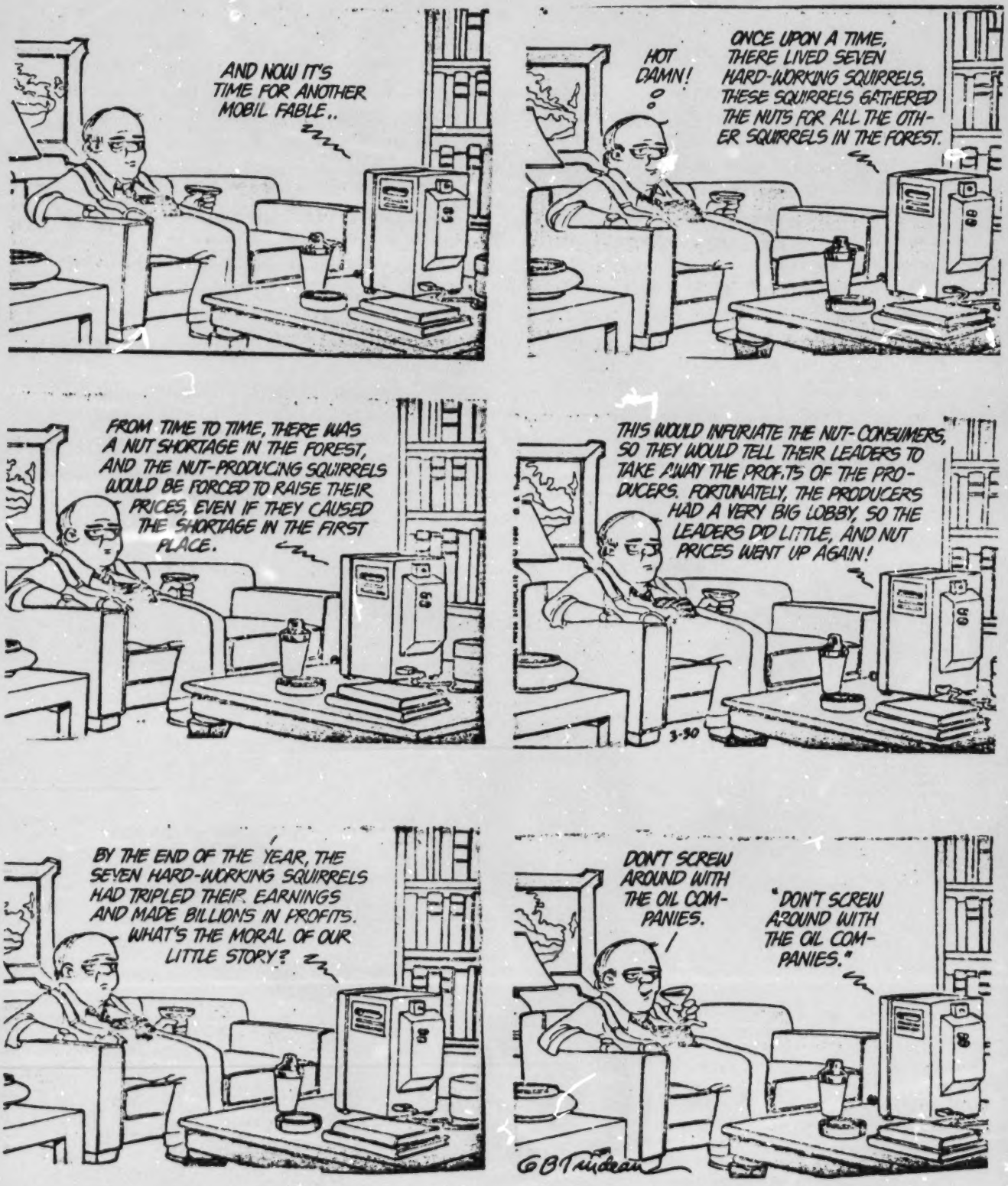

AND NOW IT'S TIME FOR ANOTHER MOBIL FABLE..
HOT DAMN!
ONCE UPON A TIME, THERE LIVED SEVEN HARD-WORKING SQUIRRELS. THESE SQUIRRELS GATHERED THE NUTS FOR ALL THE OTHER SQUIRRELS IN THE FOREST.
FROM TIME TO TIME, THERE WAS A NUT SHORTAGE IN THE FOREST, AND THE NUT-PRODUCING SQUIRRELS WOULD BE FORCED TO RAISE THEIR PRICES, EVEN IF THEY CAUSED THE SHORTAGE IN THE FIRST PLACE.
THIS WOULD INFURIATE THE NUT-CONSUMERS, SO THEY WOULD TELL THEIR LEADERS TO TAKE AWAY THE PROFITS OF THE PRODUCERS. FORTUNATELY, THE PRODUCERS HAD A VERY BIG LOBBY, SO THE LEADERS DID LITTLE, AND NUT PRICES WENT UP AGAIN!
3-30
BY THE END OF THE YEAR, THE SEVEN HARD-WORKING SQUIRRELS HAD TRIPLED THEIR EARNINGS AND MADE BILLIONS IN PROFITS. WHAT'S THE MORAL OF OUR LITTLE STORY?
DON'T SCREW AROUND WITH THE OIL COMPANIES.
"DON'T SCREW AROUND WITH THE OIL COMPANIES."
GB Trudeau

EXHIBIT #6 CONTINUED

A Fable For Now:

There once was a squirrel who collected nuts and stored them. In this way, he was able to see himself safely through the long, hard, cold winters.

Other squirrels soon noticed how good he was at finding nuts, collecting them, and bringing them home. So they asked if he would do the same for them. They, in turn, agreed to pay him for his services.

Soon, he was finding and delivering nuts to squirrels near and far. As might be expected, nuts became harder and harder for the squirrel to find. Because the search became more difficult, it cost him more. (He had by now devised an ingenious transportation system to move nuts from one squirrel community to another.) So he raised the price he charged the other squirrels.

This, of course, caused some concern, particularly among those squirrels who weren't familiar with the nut gatherer's problems. Because they never had to look for nuts, they thought nuts must be awfully easy to find, harvest, and deliver. And so they appealed to the Supreme Squirrel.

He, in his wisdom, determined that a Furry Persons' Committee should determine what price the squirrel should charge for his nuts. The Committee set a low price, and all the other squirrels thought that decision was, in their words, "a real gasser."

"Now we won't have to shell out so much," they said.

On the other hand, the nut-gathering squirrel wasn't too crazy about the price that was set.

"Why should I knock myself out?" he said. "This is tough work, and if I can't squirrel away a little something for myself, I'd be crazy to look for nuts in hard-to-find places."

And so, his incentive gone, he stopped searching in those hard-to-find places. Pretty soon, he began to run out of nuts. Naturally, he started cutting back on deliveries to far-away squirrels. And, naturally, his customers were upset. They couldn't understand why there were not enough nuts to go around.

So, the first squirrel patiently explained: "You wanted nuts on your terms, and as long as I could supply them to you on that basis, I did. Because nuts were so cheap you used more and more. Now, they're just too expensive to find. Unless you get the Furry Persons' Committee to stop telling me what price I can charge, you're going to have to get along with fewer nuts."

Moral: When the Supreme Squirrel interferes with the pricing of nuts, it's enough to drive you up a tree. Which reminds us: The U.S. is still suffering from the Supreme Court's 1954 decision to let the Federal Power Commission regulate the price of natural gas shipped across state lines. In the government's eagerness to keep prices low, it hurt the industry's incentive to find more gas. Only decontrol of new natural gas can restore that incentive. And that's no fable.

A. Fables usually have a meaning beyond the immediate situation. What point of view do you think Mobil was trying to get across to the general public in A Fable For Now?

B. Do you agree with Mobil?

C. What do you think would be an appropriate title for the Trudeau comic strip?

D. What do you think are Trudeau's main economic beliefs about the oil crisis, based on his cartoon?

E. How would you think Trudeau would answer the writers of Mobil fable?

F. Who do you think, Mobil or Trudeau, makes the stronger case?

EXHIBIT #7: AN OVERVIEW CHART OF STUDENT'S GRADES

(INDICATE MODIFIED, AVERAGE, HONORS, ETC.)

FORMATIVE TESTS	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	SUMMATIVE SCORES #1 Incl Form _to_	#2 Incl Form _to_	#3 Incl Form _to_	#4 Incl Form _to_	REGENTS SCORE OR STANDARDIZED (IF APPLIES)	1st Mark	2nd Mark	Final Mark	# of Absence	COMMENTS
TOTAL # OF ITEMS (IF APP.)																										
MASTERY LEVEL																										
STUDENT NAME or I.D.	FORMATIVE TEST SCORES																									

MASTERY FOR THE HIGHER COGNITIVE THOUGHT PROCESSES: IS IT POSSIBLE

James Killoran, Stuart Zimmer Joel Fisher

One of the major goals of mastery learning is for the student to not only accumulate knowledge of specific information, but to acquire the ability to interpret and evaluate this new knowledge. Thus, it becomes necessary to construct tests that are diagnostic as well as prescriptive with respect to the higher cognitive thought processes.

However, this goal presents certain problems to the teacher with regard to its implimentation. The major concern of the teacher is how can the higher level congnitive thought processes be discerned, corrected and evaluated? There are basically two aspects to this problem. First, is the problem of selecting proper data. The teacher must find different data to test the same concepts and processes. If one just retests with the same data, then one is just testing the process of simple memorization. Second, in the corrective stage the teacher must address not only the content but the process as well. The correctives must be geared to the specific problems presented. Correctives dealing with memorization usually require the students to look-up a definition of term, or read a partial page in a book, or to reread his or her classroom notes. However, the correctives for the higher cognitive thought processes must focus on the specific problems that are being tested.

Up to this point, we have been talking in general terms. In order not to leave the reader guessing as to the specifics, what follows are three examples that will illustrate to the reader the test, the corrective, and the retest of the higher cognitive thought processes.

This has been broken down in the following manner:

I. Test One

A. Exhibit A is the test question.

B. Exhibit B is the corrective for that test.

C. Exhibit C is the retest question.

II. Test II

A. Exhibit D is the test question.

B. Exhibit E is the corrective for that test.

C. Exhibit F is the retest question.

III. Test III

A. Exhibit G is the test question.

B. Exhibit H is the corrective for that test.

C. Exhibit I is the retest question.

EXHIBIT A: THE TEST QUESTIONS (TEST I)

In this unit the three types of economic organizations have been examined. Listed below are several characteristics of these types of organizations. Place a T before the characteristic(s) which are TRADITIONAL, place a C before the characteristic (s) that are COMMAND, and an M before the characteristic(s) that are MARKET, or an N before those that are NONE OF THE ABOVE.

ANSWERS		EXAMPLE
M	1.	The distribution of goods and services depends on the extent to which buyers are able and willing to pay for them.
C	2.	The distribution and use of resources will depend on the goals of society.
T	3.	A person's occupation,or status will be largely determined by long-standing rules.
M	4.	The goal of the producers will be to make as large a profit as possible.
M	5.	Periods of unemployment tend to occur from time to time as demand and supply for goods and services change.
M	6.	The society will have a democratic form of government.
T	7.	Young boys think of the time when they will be men, doing the jobs that their fathers are doing.
C	8.	City workers are obliged to devote one year of working on the farms.
N	9.	A democratic form of government is best suited for highly industrialized societies.
M	10.	The boycott of meat was successful in driving down the price of meat.
T	11.	Many of these societies rely on the system of barter as a means of exchanging goods and services.
T	12.	Many marriages are arranged by one's parents.

EXHIBIT B: THE CORRECTIVE FOR TEST I

TRADITIONAL ECONOMY: In a traditional economy there is little or no systematic planning. The production and distribution of goods and services are based on rules developed in the past. The economy as a whole tend to change very little. People tend to do as their ancestors did.

MARKET ECONOMY: In a market economy individuals compete with each other for resourses and products. Economic decisions are made by independent individuals in their various roles as consumers and producers. Prices are determined by the availability of goods and services and the demand for those goods and services. An active and widespread exchange of products is largely based on supply-and-demand factors.

PLANNED ECONOMY: In a planned (or command) economy, important economic decisions are made by a central authority, usually the government. These include decisions concerning how resources are used, what goods are produced, and how products and services are distributed.

Each of these economic types is a model against which real societies may be judged. Few if any societies would fit any of the three types exactly. Today most economies are mixed although they tend to be more closely identified with one type than another. Traditional societies may contain markets that are important but not crucial to their economic existence. Market economies are often partially regulated or controlled by government agencies. This regulation, however, takes place within the contest of a market system. Finally, a planned economy may allow some markets to exist, although the governing body maintains strict control over all aspects of the economy. In some planned economies, black markets (illegal markets) may arise to supply those demands that the governments either cannot or do not wish to meet.

EXHIBIT C: RETEST QUESTION FOR TEST I

In this unit the three types of economic organizations have been examined. Listed below are several characteristics of these types of organizations. Place a T before the characteristic(s) which are TRADITIONAL, place a C before the characteristic(s) that are COMMAND and an M before the characteristic(s) that are MARKET, or an N before those that are NONE OF THE ABOVE.

ANSWERS		
M	1.	The available natural resources, labor and capital tend to be distributed on the basis of competition among producers.
C	2.	Production tends to be determined by what is good for the whole society.
T	3.	There will be a tendency for society's members to perform a variety of tasks rather than to develop highly specialized skills.
N	4.	Sports figures will be highly honored in this type of society.
M	5.	There is a tendency for black market to develop.
M	6.	The goal of consumers will be to obtain as much satisfaction as possible from their income.
T	7.	The work one faces is the same as one did yesterday, as it will be the work one does tommorrow.
T	8.	Religious groups usually hold political and economic power in a society.
C	9.	All the farmland was organized into small communes (small groups who operated the land collectively).
M	10.	Advertising is one of the biggest fields of employment.
M	11.	There are a great variety of choices for the consumer.
T	12.	Usually there will be an absence of the production of highly technical products.

The reader will see that in Exhibit A and C, the questions attempt to measure a students ability to see a particular example as illustrative of a given concept. Notice how in each of the test questions in Exhibit A and C, the student is presented with specific characteristics that exist under the three major economic types of organization. The main thinking process involved in these questions is to have the student classify each characteristic into its proper type of economic organization.

If the student had failed to achieve mastery on Exhibit A, then they are directed to examine the corrective (Exhibit B). This corrective consists of a restatement of the three major types of economic organization. This was followed by a commentary about various conditions that exist under different types of economic organization.

Notice that Exhibit C still attempts to measure the students ability to classify data. All that this test does is to use different specifics of economic organization to test the students understanding of market, command and traditional economies.

EXHIBIT D: THE TEST QUESTIONS (TEST 2)

Directions: Study the graph depicted below. Then answer the questions that follow.

NATURAL RESOURCES AND ENVIRONMENTAL FACTORS

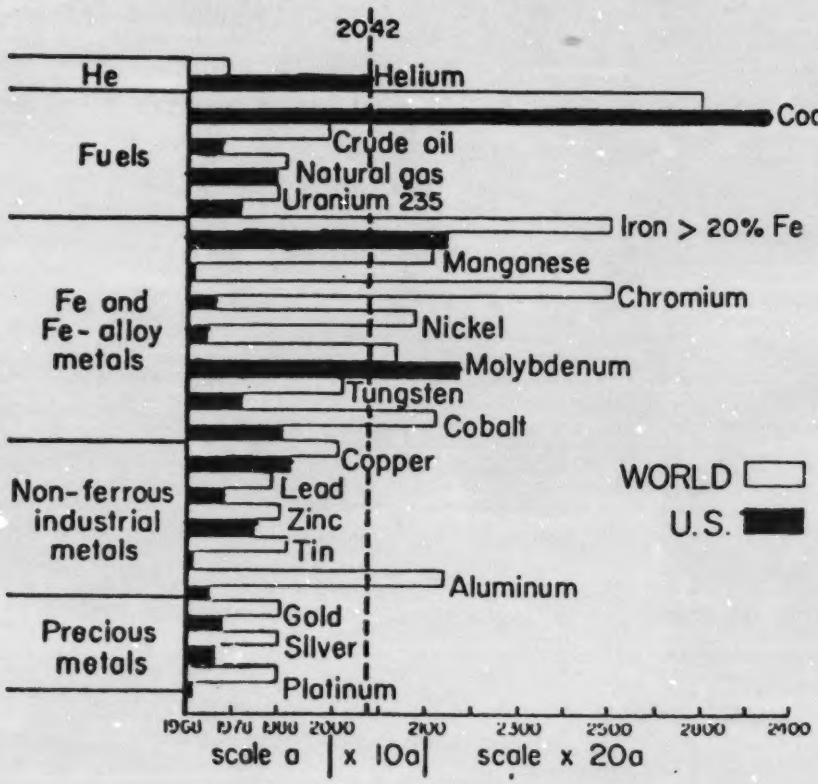


FIGURE 6

Apparent lifetimes of known recoverable reserves of 20 mineral commodities at current minable grades and rates of consumption. (Except for helium whose lifetime is estimated

1. CRUDE OIL.....Which fuel does the United States have the least in comparison to the other fuels.

2. ....c..... Which type of metals have the least known recoverable reserves? a. Fe and Fe alloy metals b. Non-ferrous industrial metals c. precious metals.

3. ....c..... According to the graph, a. the United States will never run out of Natural Resources b. The world will run out of Natural Resources by the year 2000 c. The fuel that the United States has the most of is coal d. Natural Resources are useful for man.

EXHIBIT E: THE CORRECTIVE FOR TEST 2

All graphs are really lines or pictures that give us, in a small space, information that might take pages of written text if we were to describe the same material. Thus our job, when trying to "read" a graph, is to try to figure out what information is contained in the graph. But how do we do this?

The first thing to remember is that the graph contains a lot of information. Let's look at the graph on test 1. Ask yourself, "What do I see?" This graph tells us information with heavy lines that look like bars. Thus it is called a 'bar graph'. Do you see the title of the graph at the top? It tells you what information this graph contains. Do you see the column on the left labeled Fuels He and Fe-alloy metals, etc? This tells you one of the pieces of information in this graph. The title said it would have information about natural resources, and this column shows the type of natural resources considered by this graph. Notice how these columns are different sizes. If you look to the right of this column, you will see the types of natural resources included in these categories. For example, the kind of natural resources called Fuels would be coal, crude oil, natural gas and uranium. Let us look at some of the other things we can see on this graph. Look in the lower right. See the two boxes that say World and United States? This means that when we see light colored lines, the graph is referring to world natural resources, and when we see dark lines, the graph is referring to the United States' natural resources. Therefore, you can understand why the light colored lines will be bigger than the dark colored lines. That's right, it is because the United States in only one part of the world has only some of the whole world's natural resources. In the column of coal, it seems as if the United States has more coal than all the rest of the world put together.

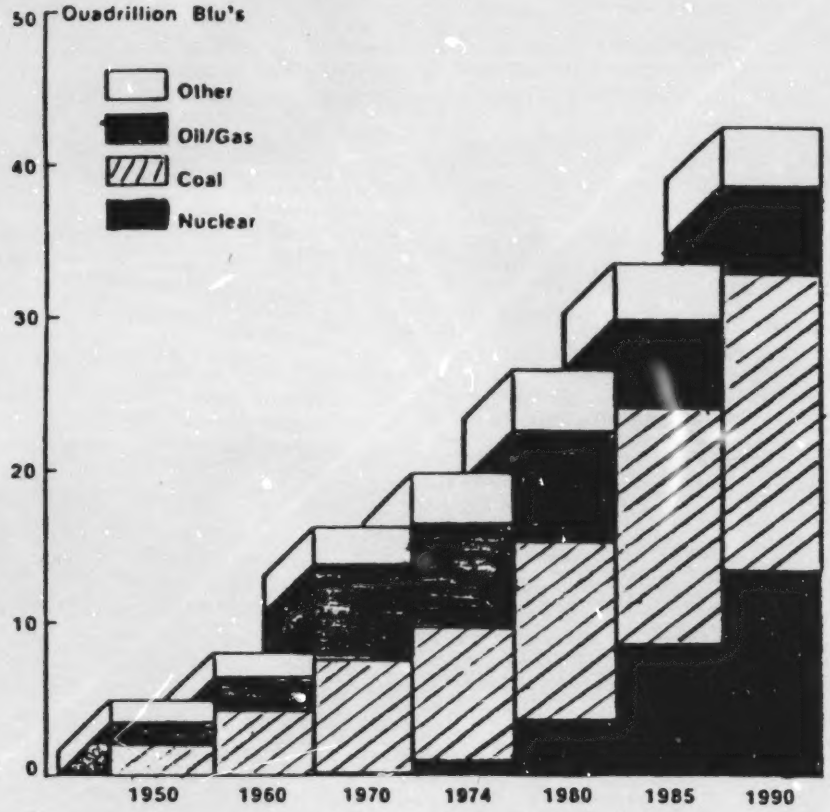
Now let us look at the numbers that run along the bottom of the graph. Notice how they represent years from 1968 to

2900. Notice how some of the colored lines are longer than others. Some, like coal, stretch all the way to the right. If you follow the end of the dark coal line and drop an imaginary line down to the year line (about the year 2900), you can guess, based on other information you see, what this is telling the reader of the graph. Hints: see the paragraph below the graph? The key words are "lifetimes of known reserves". That is correct; it means that we know that the United States has enough coal to last until the year 2900. Until what year will the world's known supply of tin last? of zinc?

See how easy it is to read a bar graph? Look at the titles on top, the numbers and words along the sides and the bottom, and see how far the bars go.

EXHIBIT F: RETEST QUESTION FOR TEST 2

DIRECTIONS: Study the graph below. Then answer the questions that follow based on the information in the graph.



C 1. According to the graph, which source of energy will be used most in the 1990's?
a. other b. oil/gas c. coal d. nuclear

C 2. According to the graph, from now to the 1990's, the use of: a. nuclear energy will decrease b. coal will remain the same c. oil/gas will remain the same d. other energy sources will be used the most.

D 3. If you were living in 1950, the one energy source you would not have known about was the use of:
a. oil b. gas c. coal d. nuclear

The reader will note that in Exhibit D (test 2), the questions seek to measure a student's ability to understand a given piece of data. What is being asked in this particular graph, is that the student understand the various parts of the graph. They are not asked to make connections, but merely to see and restate existing relationships found in the graph. All that is being required of the student is to reformulate accurately what is contained in the question given.

If a student fails to achieve mastery, the teacher must be very specific in making up a corrective. The major problem with correctives dealing with graphs is that one must examine that data in great detail. Exhibit E deals with how a student should have examined Exhibit D. The corrective points in very specific and detailed terms to the graph itself.

Notice that Exhibit F still deals with graph questions. It again measures a student's ability to understand a given piece of data. The test is using different data to test the same basic thinking process.

EXHIBIT G: THE TEST QUESTIONS (TEST 3)

A problem the world has to face is the problem of energy. Here I believe there should be no government interference in the pricing of energy sources. We do not have to fear that energy will run out if we are prepared to allow the forces of supply and demand to determine the price at which energy supplies are sold. There can be no excuse for a policy of artificial prices because such a policy, while it may appear to be helping the people of one country, is in fact a policy of encouraging the wastage of a resource which must become scarcer, If we are prepared to pay the going rate for energy, this will have the effect of encouraging people to use energy in the most careful way and not waste it. And in addition, it would encourage people to discover and develop new sources of energy.

Adapted from a speech by
William Rees

1. This unit you have studied the three basic types of economic organizations. Which of the three types of economic organization do you think William Rees prefers? Be specific in your answer.
(Identifying Issues)

2. Based on your personal knowledge and the information in this reading selection, do you think you would agree with William Rees suggestions as to how to solve the energy question? Explain your answer fully.
(Taking a defensible position)

3. The die has been cast. You are no longer a fence-sitter. You have taken a stand on an approach to solve the energy problem. Clearly list several reasons as to why you have cosen this stand and justify your answer. In addition, discuss the full consequences on American lives if your position is adopted. (Grounding a position)

EXHIBIT H: THE CORRECTIVE FOR TEST 3

The previous questions based upon the speech by William Rees calls upon you to make an evaluative type answer. Most students, along with your adult counterparts, make evaluative judgements without proper basis in fact. One must realize that all evaluations should by based on factual data previously analyzed. Thus, a student may find it helpful to take the following steps:

1. Have a knowledge of specific facts, in this case, one must know the similarities and differences between the types of economic organizations. (see data sheet). Looking at the speech you will find that Mr. Rees speaks of 'no government interference'. He has thus eliminated a command economic system. He then speaks of allowing the 'forces of supply and demand to determine the price... of energy,' and to pay 'the going rate for energy.' As you will recall, these are characteristics of a market economy.
2. Be able to identify issues in the data---one sees that Mr. Rees is a believer in the market system as the best means of allocating goods in a society.
3. Draw up a criteria on a model that <u>you</u> think is best to allocate goods in a society.
4. Compare the speaker's point of view with yours. He likes the marketsystem, do you?
5. Make a critical decision based on analysis. Why do you agree or disagree with the speaker's view about letting the market model solve our energy problems?

You might point out some of the advantages of the Market-type economy, such as its responsiveness to supply and demand conditions; the quality of the products manufactured; or how it reflects man as he really is. You might, on the other hand, point out some of the criticisms that have been made of the Market-economy such as its unfairness to some groups; its appeal to greed, and its emphasis on competition.

EXHIBIT I: THE RETEST QUESTION FOR TEST 3

A new and highly controversial theory of human behavior has been swirling through campuses across the country. Called sociobiology, the theory says that all human action, even those that appear altruistic (not selfish), are competive and selfish and are programmed into the human genes. Applying this idea to economics, the theory implies that government programs that force individuals to be less competitive and selfish then they are genetically programmed to be are guaranteed to fail. In addition, it also implies that a socialist society, based on the ideas of cooperation and devotion to a collective ideal will never last.

This theory provides a powerful defense of Adam Smith's laissez-faire (no government interference in the market place) views. In Smith's view, the self-interest and competitive spirit of man was a mechanism by which an economy became more efficient and prosperous. The individual,seeking only to increase his personal wealth, builds a better mousetrap and thereby increases the general welfare of the society.

1. Which of the three types of economic organizations do you think sociobiology supports?

2. Based on your personal knowledge and the information found in the reading, do you agree with the view expressed in Sociobiology?

3. List several reasons as to why you have chosen this stand. In addition, discuss the full consequences for a society's way of life if your stand is adopted.

The questions involved in test 3 are evaluative type questions. They ask the student to identify an issue, take a position, and then to defend that position

In order to successfully tackle a question of this nature, the student must go through a series of steps. If the student has failed to achieve mastery on the test questions, it is frequently atributable to an inability to follow a logical, step by step thought process.

The corrective shown in Exhibit H deals with this failure by giving the student a step by step solution to the problem. Note how the corrective leads the student from a knowledge of specific facts to making a critical decision.

Notice that Exhibit I still attempts to measure the same thought process. The questions asked are basically the same, the only difference is that another reading has been used.

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